Using Propane-Fired Cannons to Keep Birds Away from Vineyards

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Factsheet

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INTRODUCTION

Bird damage is a huge problem in all grape-growing areas of the world. Birds can destroy a crop and farm profits. Most agree the problem is worsening, as more hectares of tasty cultivars are grown (Figure 1).

Damage begins around veraison, when grapes start to colour, signifying change from growth to ripening and the accumulation of sugars. Damage continues through to harvest in early fall, or winter with grapes harvested for ice-wine. A field trial (Fraser, 2005) showed with no bird controls, losses were 50 per cent for Cabernet Franc and 100 per cent for Cabernet Sauvignon. Although birds prefer blue/red French hybrids and red Vinifera grapes, damage is reported in just about all grape cultivars.

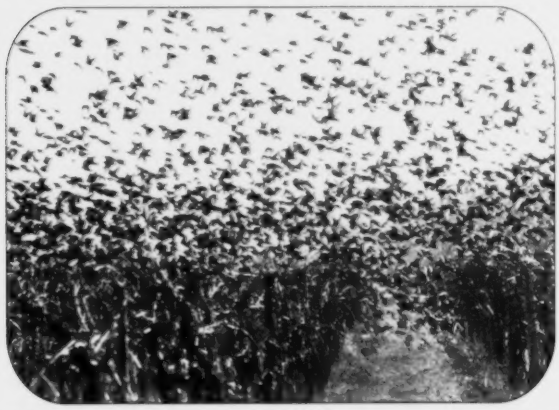

Figure 1. This huge flock of starlings was captured by the St. Catharines Standard in 2003.

BIRD CONTROL STRATEGIES

There are many bird control strategies, including visual, physical and acoustical deterrents. Experts agree a combination of methods is needed. One acoustical option is a propane-fired, bird-scaring cannon — informally known as a bird banger — that emits cannon like sounds (Figure 2). Over 80 countries on six continents use bird bangers to control crop damage (Frensch, 2008). A five year Manitoba study concluded bird bangers were very effective for scaring birds away from field corn and sunflowers. Double-firing bird bangers were found to protect more than twice the area of a single-firing bird banger. Today most bird bangers are triple-firing ones that are even more effective. These are operated electronically instead of mechanically.

HOW BIRD BANGERS WORK

Bird bangers vary in design, but operate under similar principles. They have a cylindrical barrel about 100 mm (4 in.) in diameter and 0.8 m (32 in.) in length open at one end; a spark plug; 9 kg (20 lb) tank of propane gas; valves; and control system. When activated, a valve lets propane gas into the barrel, which is then ignited by the spark plug. An explosive-type sound is created, blown out the open end of the barrel (Figures 2 and 3).

Bird bangers have a tripod with one adjustable leg to level it so it spins in all directions. Triple-firing bird bangers produce a series of three shots — the first startles birds, the second (about 8 sec. later) drives them away, and the third (about 10 sec. after the second shot) makes sure birds will not return.

The momentum from the shots causes the barrel to recoil and spin away from the direction of emitted sound. In Figure 3, looking down from above a bird banger, the recoil makes the barrel turn 'clockwise'. The bird banger will spin up to 10 times over the firing sequence before stopping, awaiting the next sequence. Tests by the author show if properly levelled a bird banger will fire in all directions over time. However, wind speed and direction can affect final pointing direction.

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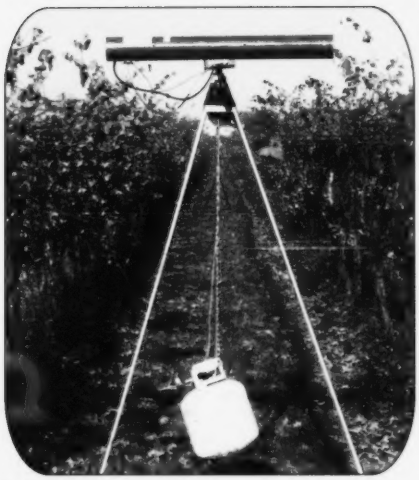

Figure 2. This side view of a bird banger shows cylindrical barrel at top, open on one end (right side in this photo), hanging tank of propane gas and tripod, levelled so the barrel will fire uniformly in all directions.

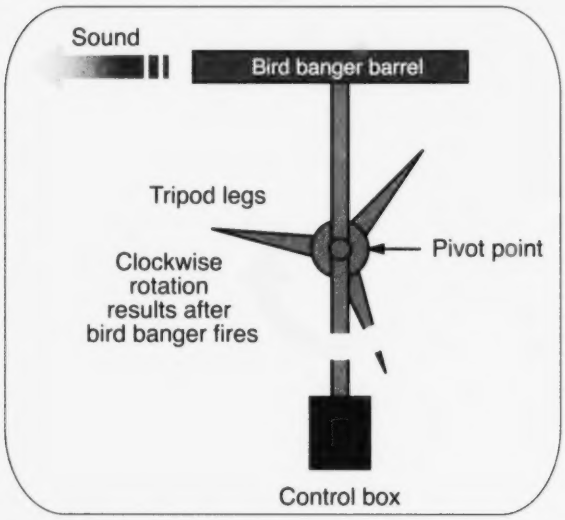

Figure 3. This overhead view shows as sound waves exit a bird banger barrel it causes recoil, turning it clockwise. Field tests show a barrel can spin 6 to 10 times before stopping, ready for next firing sequence.

If bird bangers are *not* set level they will fire more often in one direction than another, and this can be a problem if it happens to face a neighbour's home.

A control system regulates the frequency of each set of three firings to occur randomly. On most bird bangers this is one set of three firings every two to four, four to eight, eight to 16 or 16 to 32 minutes. Randomness helps keep birds wondering when the next firings will occur and prevents them from growing accustomed to the sound. Field tests by the author show firing sequences are random within the setting. So, on the four to eight minute frequency setting, expect sequences to average about every six minutes.

BEST MANAGEMENT PRACTICES FOR VINEYARDS

Here are best management practices (BMP) for bird bangers used to scare birds from vineyards, taking account of the needs of both growers and neighbours.

- Tell all neighbours living within 175 m (575 ft) of the bird bangers about when and how you plan to operate them, and who to call if there is a problem.
- Start using the bird banger no earlier than three to four weeks prior to veraison and stop use immediately after harvest.
- Operate the bird banger during daylight hours, between 30 minutes before local sunrise and 30 minutes after local sunset. See Table 1.
- Do not place adjacent bird bangers any closer to each other than 75 m (250 ft).
- Adjust timers often enough to account for later (or earlier) sunrise and sunset times throughout the season especially at Daylight Savings Time if bird bangers are still necessary beyond this date (Table 1, Figure 4).
- Where practical on large properties, move bird bangers weekly, so birds don't get used to their location.
- Do not place bird bangers within a grape row directly in line with a neighbour's house, as the row canopy can channel the sound towards the house.
- Adjust tripods so bird bangers are level, firing in all directions and not more often at neighbours.

- Monitor bird bangers so they operate properly, especially those not on, or near, your home farm.
- Take into account echoing when using bird bangers adjacent and below or on the Niagara Escarpment as it can cause echoing.
- Use light sensor over-ride devices to make sure the bird banger cannot operate at night, even if timers are adjusted improperly, especially on properties where the vineyard manager lives off-site.

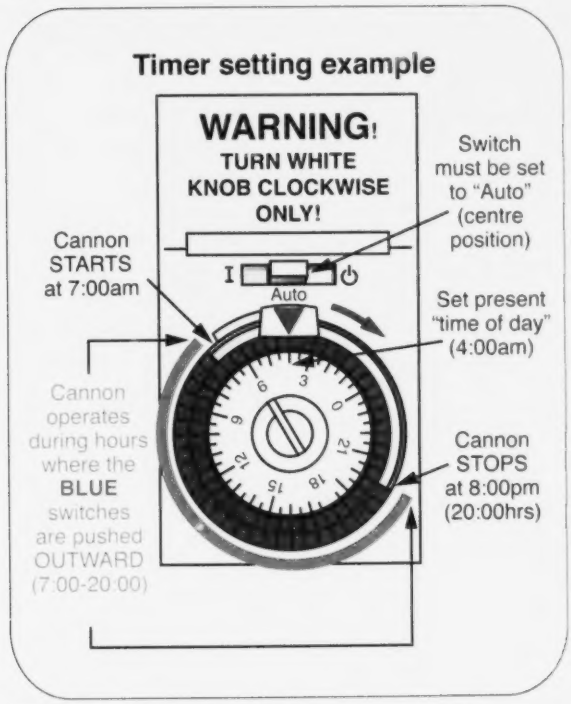
Timer setting example
WARNING!
TURN WHITE KNOB CLOCKWISE ONLY!
Switch must be set to "Auto" (centre position)
Cannon STARTS at 7:00am
Auto
Set present "time of day" (4:00am)
Cannon operates during hours where the BLUE switches are pushed OUTWARD (7:00-20:00)
Cannon STOPS at 8:00pm (20:00hrs)

Figure 4. Inside a bird banger control system box, an operator can adjust when a bird banger starts in the morning and stops in the evening. The setting shown is appropriate for September 26 at Harrow as per Table 1.

Table 1. Start/Stop Times for Operating Bird Bangers

Earliest start times (30 min. before sunrise) and latest stop times (30 min. past sunset) for bird bangers throughout typical veraison to regular or ice wine harvest dates.

Dates	Vineland W79°24', N43°09'		Harrow W82°52', N42°02'		Wellington W77°14', N44°00'	
	a.m. Start	p.m. Stop	a.m. Start	p.m. Stop	a.m. Start	p.m. Stop
1 Aug	5:39	9:09	5:55	9:20	5:28	9:02
8 Aug	5:46	9:00	6:02	9:11	5:35	8:53
15 Aug	5:54	8:49	6:10	9:01	5:43	8:42
22 Aug	6:01	8:38	6:17	8:51	5:51	8:31
29 Aug	6:09	8:27	6:24	8:39	5:59	8:19
5 Sep	6:17	8:15	6:32	8:28	6:07	8:07
12 Sep	6:24	8:02	6:39	8:15	6:15	7:54
19 Sep	6:32	7:50	6:46	8:03	6:23	7:41
26 Sep	6:40	7:37	6:54	7:51	6:31	7:28
3 Oct	6:48	7:24	7:01	7:39	6:39	7:15
10 Oct	6:56	7:12	7:09	7:27	6:48	7:03
17 Oct	7:04	7:01	7:17	7:16	6:57	6:51
24 Oct	7:13	6:50	7:25	7:06	7:06	6:40
31 Oct	7:22	6:40	7:34	6:56	7:15	6:30
Daylight savings time changes first Sunday in November						
7 Nov	6:31	5:31	6:42	5:48	6:24	5:21
14 Nov	6:40	5:24	6:51	5:41	6:33	5:13
21 Nov	6:48	5:18	6:59	5:35	6:42	5:07
28 Nov	6:57	5:15	7:07	5:32	6:51	5:03
5 Dec	7:04	5:13	7:15	5:30	6:58	5:01
12 Dec	7:11	5:13	7:21	5:30	7:05	5:01
19 Dec	7:15	5:15	7:26	5:32	7:10	5:03
26 Dec	7:18	5:19	7:29	5:36	7:13	5:07

NORMAL FARM PRACTICE AND THE FFPPA

Some neighbours do not like the sound from bird bangers — especially when the cannon is operated by vineyard managers who do not live in the area to hear when a bird banger is not working properly. Most Ontario grapes are grown near many rural neighbours, since many people like to live near vineyards/wineries. Neighbours need to be tolerant to growers for the need for bird bangers to grow grapes, but likewise growers

need to be tolerant to neighbours for the need for quiet times.

As long as they follow *normal farm practice*, farmers are protected from nuisance noise complaints launched by neighbours. The *Farming and Food Production Protection Act (FFPPA) 1998* defines normal farm practice as one which:

- is conducted in a manner consistent with proper and acceptable customs and standards, as established and followed by similar agricultural operations under similar circumstances, or
- makes use of innovative technology in a manner consistent with proper advanced farm management practices

Whether or not a farm practice is considered normal is determined by the *Normal Farm Practices Protection Board*, a quasi-judicial administrative board appointed by the provincial government, but comprised of non-government members. For information see www.omafra.gov.on.ca/english/engineer/nfppb/nfppb.htm

PRACTICES THAT ARE *NOT* NORMAL

It is frustrating for a neighbour when a bird banger is not operating within normal farm practice. Grape growers agree the following rules should apply:

- Do not operate any bird banger outside the season when grapes are reaching veraison, to the time of reasonable expectation of harvest
- Do not operate any bird banger at night, which is outside the hours shown in Table 1.
- Do not operate any bird banger closer than recommended setbacks to a home.
- Do not operate the bird banger so it points more often in the direction of a neighbour's home

BMP SETBACKS FOR BIRD BANGERS

Grape growers need the small area of farmland where conditions are favourable for growing grapes. Neighbours need peace and quiet, but have more options about living locations than growers about where to grow grapes. So, compromise is needed.

It is impractical to create setbacks based on the site-specific measured sound levels in dBA from each individual bird banger. This is because even though the emitted sound level is the same as it leaves the barrel of the bird banger, it varies greatly after release depending on localized weather conditions, wind speed and direction, topography, ground cover, direction of firing, etc. So, the current BMP setback from neighbours for normal operation of a bird banger is set to125 m (410 ft) when the bird banger is operated:

- during the *regular* grape season, ceasing about the end of October (**not** extended season for ice wine, which could go well into winter some years)
- with proper levelling of the bird banger so it spins uniformly 360o in all directions (**not** when set to fire only in a180o plane away from a neighbour's home)
- with the '*B, loud volume*' setting (**not** the '*A, quiet volume*' setting, available on some bird bangers)
- on *Frequency 2* setting (four to eight minutes sequence interval (not *Frequency 1*; two to four min.)

The 125 m (410 ft) setback has evolved and worked well for grape growers and neighbours, but other setbacks also make sense if practices are used that increase sound levels (with greater setbacks), or decrease sound levels (with lesser setbacks).

Field tests by the author explored more flexible setbacks. The 125 m setback was used as a benchmark under the four management options listed previously. It was determined sound levels, and resulting annoyance for neighbours are:

- *increased* over ice wine season, as no vegetation is present to muffle sounds, and the long season extends annoyance period. This effectively *adds* 5 dBA compared to regular season use
- *reduced* if the bird banger doesn't fire directly at a home. This effectively *drops* sound levels 5 dBA compared to bird bangers that fire at homes (Figure 5)
- *reduced* if the bird bangers are set on the 'A, quiet volume' setting, which effectively *drops* sound levels

5 dBA compared to 'B, loud volume' setting (Figure 6)

- *increased* if bird bangers are set on the faster Frequency 1 (two to four min.) sequence interval, which effectively *adds* 5 dBA compared to Frequency 2 sequence interval (four to eight min.) (Figure 6)

There are 2 x 2 x 2 x 2 = 16 combinations. Each results in setbacks based on sound levels that are effectively increased, or reduced, giving flexibility for different vineyard situations and conditions. Figure 7 demonstrates how each combination affects best management practices setbacks for bird bangers from neighbouring homes.

Example:
A grower with ice-wine grapes fires a bird banger in all directions on the 'B, loud volume' setting, with Frequency 2 (4–8 min.) firing sequence. Using Figure 7, what setback is recommended to houses?

Enter Figure 7 from centre, moving through layers: **Ice-Wine Harvest; 360°** (meaning bird banger fires in all directions); **B-Loud**; and **F2** (4–8 min.) to a ***175 m*** setback.

To reduce the setback to 125 m, one could set the bird banger on **A-Quiet** *or* restrict it to fire only in the **180°** plane away from a neighbouring home.

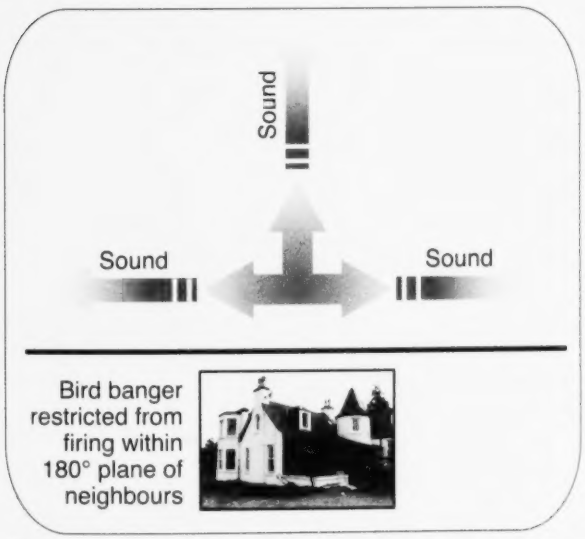

Figure 5. Bird bangers prevented from firing in the 180° plane of a neighbour effectively reduces sound 5 dBA. This could be done using springs and stops.

Figure 6. Inside a bird banger control system box, an operator can adjust shot frequency and sound level:
'1' = Frequency 1 (2–4 min. setting)
'2' = Frequency 2 (4–8 min. setting)
'3' = Frequency 3 (8–16 min. setting)
'4' = Frequency 4 (16–32 min. setting)
'A' is quiet volume sound setting; 'B' is loud.

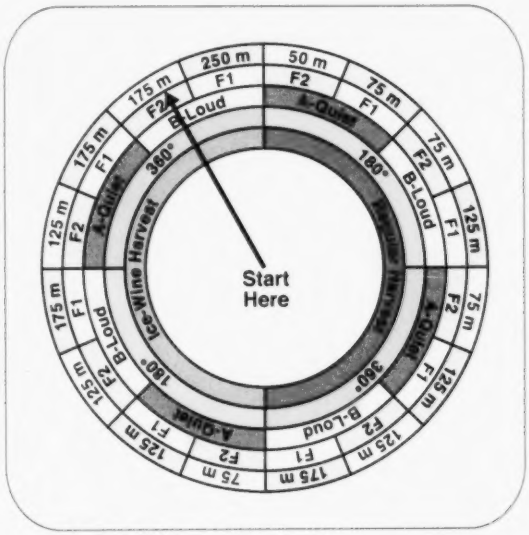

Figure 7. Ring-graph to determine bird banger setbacks to neighbours based on management strategies.

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